

REMARKS

Overview of the Office Action

Claims 12-13 and 28-29 have been rejected under 35 U.S.C. 112, second paragraph as being indefinite.

Claims 1-4, 12, and 14-16 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 6,291,839 ("Lester").

Claims 18-19 and 30-31 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 6,410,942 ("Thibeault").

Claims 18-19 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 7,064,355 ("Camras").

Claims 5-11 and 13 have been rejected under 35 U.S.C. 103(a) as unpatentable over Lester.

Claim 17 has been rejected under 35 U.S.C. 103(a) as unpatentable over Lester in view of US Patent No. 6,515,310 ("Yamazaki").

Claims 20-29 have been rejected under 35 U.S.C. 103(a) as unpatentable over Thibeault.

Claim 32 has been rejected under 35 U.S.C. 103(a) as unpatentable over Thibeault in view of Yamazaki.

Status of the claims

Claims 1- 14, 16-26, 28-30 and 32 have been amended

Claims 33-37 have been newly added.

Claims 1-37 are now pending.

Rejection of claims 12-13 and 28-29 under 35 U.S.C. 112, second paragraph

The Office Action states that the claims have been rejected for being indefinite because the limitation “the layer coupled to the first main area of the multilayer structure has a degree of reflection of at least 70% or at least 85%” is unclear because it is not known what “the degree of the reflection” refers to.

The respective word used in the original German specification is "Reflexionsgrad". This technical term is equivalent to the English term "reflectivity". The reflectivity is the ratio between reflected and incoming light intensity. Therefore, claims 12-13 and 28-29 have been amended to replace the phrase “degree of the reflection” with the word “reflectivity”.

Applicants submit that this rejection has been overcome.

Summary of subject matter disclosed in the specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

Applicants' disclosure is directed to a radiation-emitting semiconductor component that includes a multilayer structure (12). The multilayer structure (12) includes an active, radiation-generating layer (14), a reflective layer (28) or interface, a first main area (16) coupled to the reflective layer or interface, and a second main area (18) remote from the first main area for coupling out the radiation generated in the active, radiation-generating layer. The multilayer structure (12) is an epitaxial layer structure, and the semiconductor component is free of a deposition substrate of the multilayer structure (12). A region (22) of the multilayer structure (12) that adjoins the second main area (18) of the multilayer structure (12) is patterned one- or

two-dimensionally.

Descriptive summary of Lester

Lester discloses a GaN-based LED that includes a hetero-junction device 10, having an emission layer 14 interposing an n-type layer 12 and a p-type layer 16, fabricated on a substrate 8. A reflector 9 is positioned on the backside of the substrate. An n-contact 18 is electrically connected to the n-type layer 12 while the p-contact 20 is electrically connected to the p-type layer 16. Both electrical contacts are preferably made from reflective metals (i.e., metals that reflect greater than 70% of normally incident visible light). A p-bond pad 21 is positioned on the p-contact (see col. 2, lines 57-67 and Fig. 1 of Lester).

Descriptive summary of Thibeault

Thibeault discloses an LED 30 utilizing a flip-chip mounting. Micro-LEDs 32 are formed in an array by etching away semiconductor material of a full LED structure. Each micro-LED 32 has an active layer surrounded by two oppositely doped layers. Each of the micro-LEDs 32 has angled side surfaces and a top layer that is narrower than a bottom layer. The micro-LED array is formed on a first spreader layer 34 that is formed on a substrate 36. An insulating layer 38 covers the micro-LEDs and the surface of the first spreader between adjacent micro-LEDs. On each micro-LED 32, a hole is included in the insulating layer 38 for a top contact 40. A second spreader layer 42 coats the entire micro-LED array to interconnect the top contacts 40 (see Fig. 3, and col. 6, line 53 to col. 7, line 2 of Thibeault).

Descriptive summary of Camras

Camras discloses light emitting diodes with improved light extraction efficiency. In one embodiment, an LED die 4 includes a conducting transparent superstrate 30 electrically coupled to a metallization layer 20 and is electrically coupled to n-layer 8, and conducting, optionally transparent, substrate 32, which is electrically coupled to a p-layer 10 and to a contact 16. The superstrate 30 and the substrate 32 are formed, for example, from semiconductors having a band gap energy greater than the energy of photons emitted by LED die 4. A transparent optical element 2 is bonded to superstrate 30 with bonding layer 6, and n-layer 8 is electrically coupled to metallization layer 20 by n-contact 14 (see Fig 4, and col. 11, line 52 to col. 12, line 2 of Camras).

Claims 1-4, 12, and 14-16 are allowable under 35 U.S.C. §102(b) over Lester

The Office Action states that Lester teaches all of Applicants' recited elements.

Independent claim 1 has been amended to recite, inter alia, a radiation-emitting semiconductor component that includes a multilayer structure "wherein... the semiconductor component is free of a deposition substrate of the multilayer structure", which Lester fails to teach or suggest. Support for the claim amendments can be found in paragraphs [0036]-[0038] and Fig. 1 of Applicants' published specification.

The Examiner cites Fig. 5 of Lester as teaching Applicants' recited invention. Applicants respectfully disagree. As described above, and also as clearly shown in Fig. 5 of Lester, the multilayer device of Lester includes a substrate 8.

According to Lester "The top surface of the LED has been roughened, preferably in alignment with the openings in the contact. This may be achieved by etching the GaN in a self-

aligned fashion during the same lithographic step used to pattern the contact. The etched holes can extend into the p-layer 16 or can be etched as deep as the substrate” (see Fig. 5, and col. 5, lines 8-14 of Lester).

In contrast to Lester, and as clearly shown in Applicants’ Fig. 1, Applicants’ multilayer structure 12 is free of a deposition substrate. Therefore, Lester clearly fails to teach or suggest a radiation-emitting semiconductor component that includes a multilayer structure “wherein... the semiconductor component is free of a deposition substrate of the multilayer structure”, as recited in Applicants’ amended claim 1.

In view of the foregoing, Applicants submit that Lester fails to teach or suggest the subject matter recited in independent claim 1. Accordingly, claim 1 is patentable over Lester under 35 U.S.C. §102(b).

Dependent claims

Claims 1-4, 12, and 14-16, which depend from amended independent claim 1 incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Lester for at least those reasons discussed above with respect to claim 1.

Claims 18-19 and 30-31 are allowable under 35 U.S.C. §102(b) over Thibeault

The Office Action states that Thibeault teaches all of Applicants’ recited elements.

Independent claim 18 has been amended to recite, inter alia, a radiation-emitting semiconductor component that includes a multilayer structure “wherein... the semiconductor component is free of a deposition substrate of the multilayer structure”, which Thibeault fails to

teach or suggest. Support for the claim amendments can be found in paragraphs [0052]-[0053] and Fig. 5 of Applicants' published specification.

The Examiner cites Fig. 3 of Thibeault as teaching Applicants' recited invention. Applicants respectfully disagree. As described above, and also as clearly shown in Fig. 3 of Thibeault, the multilayer device of Thibeault includes a substrate 36.

In contrast to Thibeault, and as clearly shown in Applicants' Fig. 5, Applicants' multilayer structure 12 is free of a deposition substrate. Therefore, Thibeault clearly fails to teach or suggest a radiation-emitting semiconductor component that includes a multilayer structure "wherein... the semiconductor component is free of a deposition substrate of the multilayer structure", as recited in Applicants' amended claim 18.

In view of the foregoing, Applicants submit that Thibeault fails to teach or suggest the subject matter recited in independent claim 18. Accordingly, claim 18 is patentable over Thibeault under 35 U.S.C. §102(b).

Dependent claims

Claims 19 and 30-31, which depend from amended independent claim 18 incorporate all of the limitations of independent claim 18 and are, therefore, deemed to be patentably distinct over Thibeault for at least those reasons discussed above with respect to claim 18.

Claims 18 and 19 are allowable under 35 U.S.C. §102(b) over Camras

The Office Action states that Camras teaches all of Applicants' recited elements.

As previously mentioned, independent claim 18 has been amended to recite, inter alia, a radiation-emitting semiconductor component that includes a multilayer structure "wherein... the

semiconductor component is free of a deposition substrate of the multilayer structure”, which Thibeault fails to teach or suggest. Support for the claim amendments can be found in paragraphs [0052]-[0053] and Fig. 5 of Applicants’ published specification.

The Examiner cites Fig. 4 of Camras as teaching Applicants’ recited invention. Applicants respectfully disagree. As described above, and also as clearly shown in Fig. 4 of Camras, the multilayer device of Camras includes a substrate 32.

In contrast to Camras, and as clearly shown in Applicants’ Fig. 5, Applicants’ multilayer structure 12 is free of a deposition substrate. Therefore, Camras clearly fails to teach or suggest a radiation-emitting semiconductor component that includes a multilayer structure “wherein... the semiconductor component is free of a deposition substrate of the multilayer structure”, as recited in Applicants’ amended claim 18.

In view of the foregoing, Applicants submit that Camras fail to teach or suggest the subject matter recited in independent claim 18. Accordingly, claim 18 is patentable over Camras under 35 U.S.C. §102(b).

Dependent claims

Claim 19, which depends from amended independent claim 18 incorporates all of the limitations of independent claim 18 and is, therefore, deemed to be patentably distinct over Camras for at least those reasons discussed above with respect to claim 18.

Claims 5-11 and 13 are allowable under 35 U.S.C. §103(a)

The Office Action states that Lester teaches all of Applicants' elements recited in claim 1.

As previously discussed, Lester does not teach or suggest the subject matter recited in Applicants' independent claim 1.

Claims 5-11 and 13, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Lester for at least those reasons discussed above with respect to independent claim 1.

Claim 17 is allowable under 35 U.S.C. 103(a)

The Office Action states that the combination of Lester and Yamazaki teaches all of Applicants' recited elements.

As previously discussed, Lester does not teach or suggest the subject matter recited in Applicant's independent claim 1.

Because Lester does not teach or suggest the subject matter recited in amended claim 1, and because Yamazaki does not teach or suggest the elements of claim 1 that Lester is missing, the addition of Yamazaki to the reference combination fails to remedy the above-described deficiencies of Lester.

Claim 17, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Lester and Yamazaki for at least those reasons discussed above with respect to independent claim 1.

Claims 20-29 are allowable under 35 U.S.C. 103(a)

The Office Action states that Thibeault teaches all of Applicants' elements recited in claim 18.

As previously discussed, Thibeault does not teach or suggest the subject matter recited in Applicants' independent claim 18.

Claims 20-29, which depend from amended independent claim 18 incorporate all of the limitations of independent claim 18 and are, therefore, deemed to be patentably distinct over Thibeault for at least those reasons discussed above with respect to claim 18.

Claim 32 is allowable under 35 U.S.C. 103(a)

The Office Action states that the combination of Thibeault and Yamazaki teaches all of Applicants' recited elements.

As previously discussed, Thibeault does not teach or suggest the subject matter recited in Applicant's independent claim 18.

Because Thibeault does not teach or suggest the subject matter recited in amended claim 18, and because Yamazaki does not teach or suggest the elements of claim 18 that Thibeault is missing, the addition of Yamazaki to the reference combination fails to remedy the above-described deficiencies of Thibeault.

Claim 32, which depends from independent claim 18, incorporates all of the limitations of independent claim 18 and is, therefore, deemed to be patentably distinct over Thibeault and Yamazaki for at least those reasons discussed above with respect to independent claim 18.

Newly added claims 33-37

Claims 33-37 have been newly added. Support for claims 33 and 34 can be found in Applicants' original claim 1. Support for claims 35 and 36 can be found in Fig. 5 of the present application. Support for claim 37 can be found in paragraph [0054], and Fig. 5 of the present application.

Claim 33, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over the cited references for at least those reasons discussed above with respect to independent claim 1.

Claims 34-37, which depend from amended independent claim 18 incorporate all of the limitations of independent claim 18 and are, therefore, deemed to be patentably distinct over the cited references for at least those reasons discussed above with respect to claim 18.

Conclusion

In view of the foregoing, reconsideration and withdrawal of all rejections, and allowance of all pending claims is respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no additional fees or charges are required at this time in connection with the present application. However, if any additional fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
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Dated: July 17, 2008